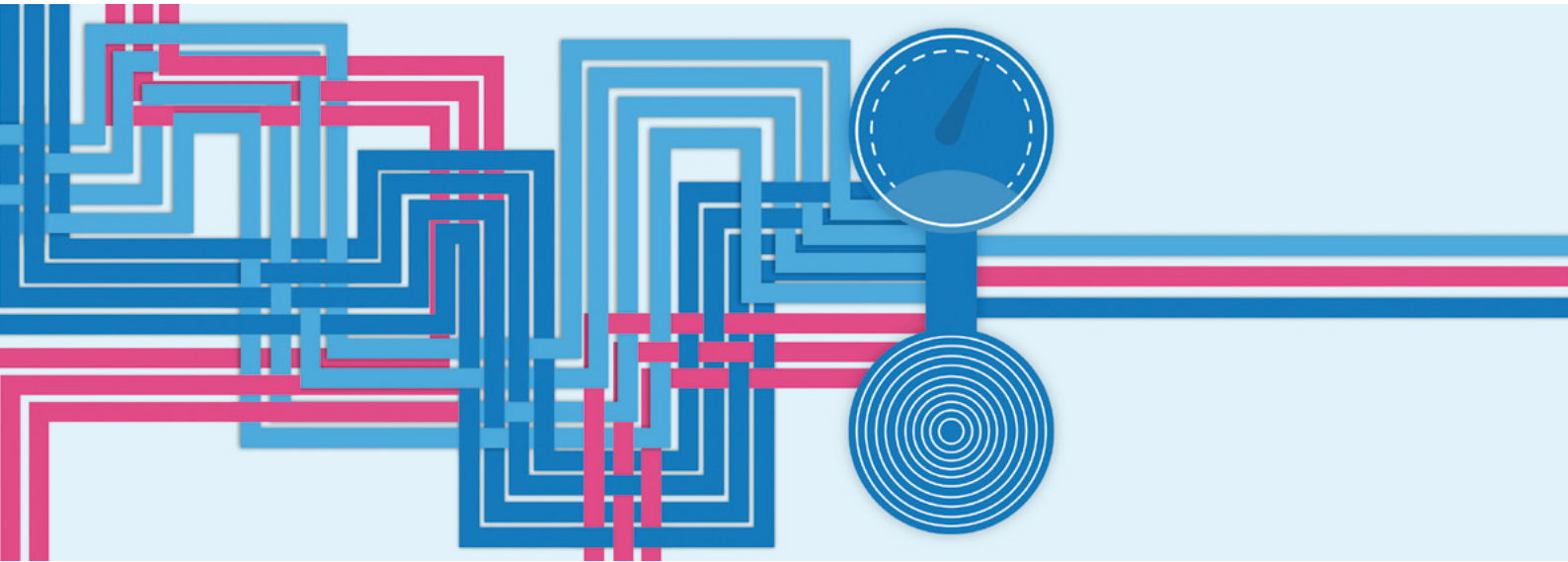




Case Study: Delivering perfect plantstops for enhanced performance



Projects that aim for excellence

Introduction

Yara International is one of the leading fertilizer production companies worldwide. The company offers a range of fertilizer and industrial products of which the production of urea is one. With 200 facilities in 160 countries and 28 production sites around the world, Yara can guarantee a dependable supply of urea for all industrial applications and animal feed.

As part of Yara's sustainability ambitions to reduce its own emissions and improve productivity at its production sites, operational excellence and continuous process improvement is key. René van Dalen, Maintenance Engineer Electrical and Instrumentation, is tasked with supporting local maintenance departments, turnarounds and projects. "As a team we are always looking ahead, on a continuous journey to further improve our processes and operations," says René. All with the aim of improving reliability at plants and optimizing end-to-end business processes.

"As a team we are always looking ahead, on a continuous journey to further improve our processes and operations."

René van Dalen, Maintenance Engineer Electrical and Instrumentation Yara International

Company	Yara International ASA
Location	Sluiskil (Ureum Factory 7)
Country	The Netherlands
Website	www.yara.com
Technology	Stamicarbon
Present capacity	3500 ktpa
Final Product	tkFT UAS Granulation
Start-up date	2011



Turnaround activities underway at Yara International's production site in Sluiskil, The Netherlands.

“We simply cannot risk having to shut down a factory because of a failing instrument, that’s why we choose the most reliable solutions.”

René van Dalen, Maintenance Engineer Electrical and Instrumentation Yara International

Securing reliable dP level measurements with diaphragm seal systems

Pressure and differential pressure measurements are vital in urea plants. They are used to monitor and control the urea production process. These measurements, particularly in the high pressure synthesis phase, are critical and operate in a challenging process environment. This environment is highly corrosive, with temperatures reaching 180°C and pressures reaching up to 170 bar. This demands for the highest requirements in terms of material specification and construction of the diaphragm seal system. This is where Badotherm comes in, as a manufacturer and supplier of high-quality diaphragm seal solutions.

Specifically for these situations, Badotherm manufactures their diaphragm seals from full zirconium material, with increased thickness of the measuring diaphragm, to withstand the highly corrosive and high-pressure environments in the plant. Yara Sluiskil has been relying on these diaphragm seal systems since 2014.

Avoiding instrument failures is paramount in the urea production process, as replacements cannot be made while the process is in operation. “We simply cannot risk having to shut down a factory because of a failing instrument, that’s why we choose the most reliable solutions for those applications,” says René.

Apart from designing and producing highly reliable systems, Badotherm stands out for their short communication lines and flexibility in providing diaphragm seal systems. “They specialize in diaphragm seal related pressure and dP level measurements, with the added advantage of being conveniently located nearby, ensuring their service is both prompt and efficient. Furthermore, their commitment to sustainability and circularity is evident through their provision of partial replacements and the reuse of materials whenever viable,” René comments.

Plant stops: when “plans need to come together”

Plant stops and turnarounds are a critical moment for any industrial process. At Yara's urea plant in Sluiskil, plant stops are kept to a minimum, with a four-year interval. During a plant stop, months of preparations come together as thousands of tasks need to be performed, and project planning is essential. For maintenance engineers like René van Dalen, overseeing the process, plant stops are like preparing for a big sports event, and everything needs to fall in place to achieve the objectives and be back in business on time. These stops are essential for ensuring the safety, reliability, and efficiency of the equipment and processes, which ultimately translates into the sustained performance of the plant, its extended lifespan, and overall productivity.

After being in operation for four years, 18 of Badotherm's diaphragm seals systems were partially replaced during the plant stop in 2018. Unfortunately, many of the seals were damaged during disassembly due to wrong handling and the use of power jet cleaners, destroying the diaphragms. However, Yara and Badotherm recognized this as a valuable learning opportunity to enhance future plant stops. Yara took the initiative to review and improve its installation protocols, while Badotherm implemented enhancements to the diaphragm seal's design. Furthermore, Badotherm proposed extending additional services to Yara, providing crucial support during the plant shutdown process.



Examples of Badotherm diaphragm seals that were damaged as a result of wrong handling during the turnaround and the use of power jet cleaners during the 2018 plant stop.

Flawless Diaphragm Seal System Replacement and improved configuration

The improvements paid off during the most recent plant stop in 2022, where all of the diaphragm seals were successfully removed and reinstalled without any damage. During the plant stop, Badotherm assigned an application specialist to oversee the process and actually managed the dismantling and installation of the diaphragm seals systems on site.

This not only unburdened Yara's team but also ensured that the installation process was executed in a flawless manner, from start to finish with the sub-contractors,

who often are unaware of the vulnerability of the diaphragm seals. All 18 diaphragm seal related instruments were checked, repaired or delivered new. In line with Badotherm's standard practice, all instruments were fully tested and calibrated before leaving the factory. All this within a period of 3 weeks. "Besides providing technical expertise, Badotherm's expert also acted as a project manager, taking care of logistics and planning activities. This additional support greatly eased our workload," René commented.



Turnaround dismantling activities of diaphragm seals in full swing. In total 18 instruments were checked, repaired or delivered new.

“Besides providing technical expertise, Badotherm's expert also acted as a project manager, taking care of logistics and planning activities.

René van Dalen, Maintenance Engineer Electrical and Instrumentation Yara International

“On-site visits always have and continue to feed us with inspiration and ideas”

Sander Posthumus, Sales and Marketing Director Badotherm

Furthermore, Badotherm incorporated several improvements in the configuration of the diaphragm seal system, including adding handgrips to the heavy parts of the system, making it easier to disassemble and assemble the instruments without causing any damage. “We prefer to take a collaborative approach with our customers”, Sander Posthumus says.

“Ideas like the use of lifting handles for the 3” cl. 2500 RF flanged instruments or lifting eyes are always recommended, but become even more apparent when we are at our customer's site. On-site visits always have and continue to feed us with inspiration and ideas”.



Diaphragm seal systems that were reintroduced into the process included relevant design improvements, such as added lifting handles for easier and more controlled placement of the very heavy 3” cl 2500 flanged EXT type seals.

Conclusion

Yara's partnership with Badotherm has been instrumental in helping the company achieve Yara's sustainability goals. By working closely with Yara's maintenance team and learning from the challenges faced during plant stops, Badotherm has been able to continuously improve its products and services. This has enabled Yara to produce urea even more efficiently and sustainably, increasing the overall plant safety, whilst minimizing the risk of production losses due to equipment failures.

Want more detail about this project and application of full body zirconium diaphragm seals?

Feel free to reach out to our specialists!

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